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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/645,349	08/21/2003	Pieter van Rooyen	1772/16131US02	6747

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EXAMINER

MULL, FRED H

ART UNIT PAPER NUMBER

3662

DATE MAILED: 03/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/645,349

Applicant(s)

ROOYEN ET AL.

Examiner

Fred H. Mull

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-9 is/are allowed.
- 6) ☒ Claim(s) 10-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments on p. 13-15, with respect to the rejection(s) of claim 10 over Rouphael have been fully considered but they are not persuasive.

Firstly, applicant argues there is not necessarily one signal processing chain for each of the M antenna elements (p. 14, 4th ¶). A secondary reference has been added to show this would have been obvious.

Secondly, applicant argues "it is also not inherent that an array processing module must be present in Rouphael where the array processing module generates N signal responses using **all** of the generated M replicas the received signal." (p. 14, 4th ¶). This is unclear in that it states it is unnecessary that the array processing module is present when the array processing module generates something. If it were not necessary for the array processing module to be present, there would be no need to make reference to it when describing what is occurring. The second half of the sentence appears to say that it is not necessarily the case that all of the M replicas of the received signal are used. However, Rouphael discloses that the odd numbered ones of the N new set of signals are the M received signals (p. 532, col. 2, 1st ¶). Thus, all of the M generated replicas are used to form the N new set of signals.

2. Applicant's arguments on p. 15-17, with respect to the rejection(s) of claim 20 over Rouphael have been fully considered but they are not persuasive.

Applicant argues "it is not inherent that a means for determining a response of **each** of the M physical antenna elements must be present in Rouphael." (p. 17, 1st ¶). As described above, each of the M signals is used. Additionally, a secondary reference now shows that using a separate signal processing chain for each of the M physical elements would have been obvious. However, it is noted that claim 20 does not include limitation directed to signal processing chains.

3. Applicant's arguments on p. 17-20, with respect to the rejection(s) of claim 29 over Rouphael have been fully considered but they are not persuasive.

Firstly applicant argues "it is not inherent that an interpolation module coupled to the M signal processing chains, where the interpolation module is configured to generate N signal response values for an antenna array as a function of the M replicas of the received signal, must be present in Rouphael." (p. 19, 2nd ¶). However, Rouphael discloses the virtual signals are generated by interpolating the M physical signals (p. 531, section II). The examiner fails to see how this is possible if the interpolation module is not coupled to the M physical signal processing results.

Secondly, applicant argues there is not necessarily one signal processing chain for each of the M antenna elements (p. 19, 2nd ¶). As noted above, a secondary reference has been added to show this would have been obvious.

4. Applicant's arguments on p. 20, with respect to the rejection(s) of claims 11-19, 21-28, and 30-33 over Rouphael have been fully considered but they are not persuasive.

Since these claims are not argued separately and the parent claims remain rejected, these claims remain rejected as well.

5. Applicant's arguments on p. 20-21, with respect to the rejection(s) of claims 1 and 20 over Klukas, specifically the argument on p. 21, 2nd ¶, lines 6-7, have been fully considered and are persuasive. The rejection(s) of these claims have been withdrawn.

6. Applicant's arguments on p. 21-24, with respect to the rejection(s) of claims 10 over Klukas have been fully considered but they are not persuasive.

Firstly, applicant argues there is not necessarily one signal processing chain for each of the M antenna elements (p. 23, 3rd ¶). A secondary reference has been added to show this would have been obvious.

Secondly, applicant argues "it is also not inherent that an array processing module must be present in Kluas where the array processing module generates N signal responses using **all** of the generated M replicas the received signal." (p. 23, 3rd ¶). This is unclear in that it states it is unnecessary that the array processing module is present when the array processing module generates something. If it were not necessary for the array processing module to be present, there would be no need to make reference to it when describing what is occurring. The second half of the sentence appears to say that it is not necessarily the case that all of the M replicas of the received signal are used. However, Kluas discloses using two elements (p. 343, col. 1, 3rd ¶, lines 3-4) and that, when the vehicle is traveling in a strait line (as vehicles often do), both antennas are required (p. 343, col. 1, 3rd ¶, lines 12-15). Thus, all of the M=2 generated replicas are used.

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7. Applicant's arguments on p. 24, with respect to the rejection(s) of claims 2-9 and 21-28 over Klukas have been fully considered and are persuasive. The rejection(s) of these claims have been withdrawn.

8. Applicant's arguments on p. 24, with respect to the rejection(s) of claims 11-19 over Klukas have been fully considered but they are not persuasive.

Since these claims are not argued separately and the parent claim remains rejected, these claims remain rejected as well.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 20-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Roupael.

In regard to claims 20, and 23-27, Roupael discloses:

receiving M replicas of the signal, each of the M replicas being received by one of a corresponding M physical antenna elements of the antenna array;

determining M responses of the M physical antenna elements to the signal, each of the M responses corresponding to one of the M physical antenna elements; and

generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations

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along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements (p. 531, section I, 2nd ¶; p. 533, final ¶).

In regard to claim 21 Roupael further discloses N-M responses of the N responses are associated with virtual antenna elements located among the physical antenna elements (p. 531, section I, 2nd ¶; p. 533, final ¶).

In regard to claim 22, Roupael further discloses at least one of the N-M responses is generated by interpolating at least two of the M responses (p. 531, section II).

In regard to claim 28, Roupael further discloses the signal complies with a communication protocol selected from the group consisting of: orthogonal frequency division multiplexing (OFDM), time division multiple access (TDMA), code division multiple access (CDMA), gaussian minimum shift keying (GMSK), complementary code keying (CCK), quadrature phase shift keying (QPSK), frequency shift keying (FSK), phase shift keying (PSK), and quadrature amplitude modulation (QAM) (p. 531, section I, 1st ¶).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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10. Claims 10-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rouphael in view of Kawakubo.

In regard to claims 10-11, 14, 16-18, 20, and 23-27, Rouphael discloses:

an antenna array including M physical antenna elements, wherein the M physical antenna elements are spatially arranged to receive one of a corresponding M replicas of the signal so as to be capable of generating M replicas of the received signal; and

wherein the array processing module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal; wherein the N signal response values include at least one virtual antenna response value, wherein N is greater than M (p. 531, section I, 2nd ¶; p. 533, final ¶).

Rouphael stresses the procedure of array processing, rather than the hardware implementation of the procedure. Thus, Rouphael fails to disclose an array processing module including M signal processing chains, wherein the signal processing chains are coupled to the M physical antenna elements.

Kawakubo discloses that a signal processing may be implemented in several ways (col. 5, lines 16-25), including one signal processing chain for all the antennas (Fig. 1) or one signal processing chain for each of the antennas (Fig. 5).

It would have been obvious, given the disclosure by Kawakubo that signal processing may be implemented in several ways (col. 5, lines 16-25), including one signal processing chain for all the antennas (Fig. 1) or one signal processing chain for each of the antennas (Fig. 5), to implement the signal processing procedure of

Rouphael with the known implementation of using one signal processing chain for each of the antennas (Fig. 5).

In regard to claims 15, and 21 Rouphael further discloses N-M responses of the N responses are associated with virtual antenna elements located among the physical antenna elements (p. 531, section I, 2nd ¶; p. 533, final ¶).

In regard to claims 12-13, and 22, Rouphael further discloses at least one of the N-M responses is generated by interpolating at least two of the M responses (p. 531, section II).

In regard to claims 19, and 28, Rouphael further discloses the signal complies with a communication protocol selected from the group consisting of: orthogonal frequency division multiplexing (OFDM), time division multiple access (TDMA), code division multiple access (CDMA), gaussian minimum shift keying (GMSK), complementary code keying (CCK), quadrature phase shift keying (QPSK), frequency shift keying (FSK), phase shift keying (PSK), and quadrature amplitude modulation (QAM) (p. 531, section I, 1st ¶).

In regard to claims 29-33, Rouphael further discloses that N is greater than M (p. 533, final ¶), where M=10 and N=19.

11. Claims 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klukas in view of Kawakubo.

Klukas discloses:

an antenna array including M physical antenna elements, wherein the M physical antenna elements are spatially arranged to receive one of a corresponding M replicas of the signal so as to be capable of generating M replicas of the received signal; and

wherein the array processing module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal; wherein the N signal response values include at least one virtual antenna response value, wherein N is greater than M (p. 342, final ¶ to p. 343, col. 1).

Klukas stresses the procedure of array processing, rather than the hardware implementation of the procedure. Thus, Klukas fails to disclose an array processing module including M signal processing chains, wherein the signal processing chains are coupled to the M physical antenna elements.

Kawakubo discloses that a signal processing may be implemented in several ways (col. 5, lines 16-25), including one signal processing chain for all the antennas (Fig. 1) or one signal processing chain for each of the antennas (Fig. 5).

It would have been obvious, given the disclosure by Kawakubo that signal processing may be implemented in several ways (col. 5, lines 16-25), including one signal processing chain for all the antennas (Fig. 1) or one signal processing chain for each of the antennas (Fig. 5), to implement the signal processing procedure of Klukas with the known implementation of using one signal processing chain for each of the antennas (Fig. 5).

Allowable Subject Matter

12. Claim(s) 1-9 is/are allowed.

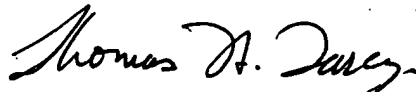
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred H. Mull whose telephone number is 571-272-6975. The examiner can normally be reached on Monday through Friday from approximately 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas H. Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Fred H. Mull
Examiner
Art Unit 3662

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